Harnessing the Industrial Metaverse and Al

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Industrial Metaverse – unlocking a wide range of innovative applications: Digital Twin

A place where fast engineering decisions are made leveraging precise robust data – Real and Digital.

Visualizing the Digital Twin in its context, gaining insights in a realistic environment

Meet in real-time, to collaboratively review the Digital Twin and effect changes immediately

Continuously and interactively evaluate, simulate and predict Digital Twin behavior

Monitor, analyze and manage real assets in closed-loop with the Digital Twin







Industrial Metaverse An evolution, not a revolution



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What is a Comprehensive Digital Twin and why does it matter?

Precise virtual representation of a physical product or process

Used across its lifecycle to simulate, predict and optimize the product and production system

Made up of multiple representations or models for different aspects of physical behavior

An evolving object with a lifecycle that needs to be managed

Closed-loop digital twin provides for bi-directional connectivity between the physical asset and the virtual representation

Provides insights to continuously optimize product and production





Siemens Executable Digital Twin for smarter products, systems processes

Digital DT Real	Self-contained executable digital beh an asset
	Leveraged by anyone at any point in lifecycle

- Developed and released by experts
- Real time enabled
- Self-adapting/calibrating
- No additional solvers required
- Deployed from edge to cloud
- Industrial Metaverse behavior of assets





Sustainable Digital Enterprise – Product and Production lifecycles

Industrial Metaverse Use cases are managed across the Product and Production Lifecycles into six key domains for each industry

- 1. Product Development
- 2. Product Production
- 3. Product Performance
- 4. Plant Development
- 5. Product Operation
- 6. Plant Performance







Industrial Metaverse

CRAFTED IN PLYMOUTH, ENGLAND

Eliminate physical prototypes with precise physicsbased simulations in an Industrial Metaverse experience





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Photoreal Digital Twin Visualization in Teamcenter X

Siemens Industrial Metaverse | Hannover Messe 2024





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NX Immersive Designer

Seamlessly connecting the real and digital worlds.

SONY

XR Head Mounted Display

The most natural way to experience the Digital Twin.

Immersive Engineering SONY hardware highlights



4k Resolution per eye

Precision controllers for engineering

Comfortably balanced for extended use

Flip-up visor for easy switching

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Immersive Engineering Immersive design



Connect the real and digital worlds with NX Immersive Designer



Industrial Metaverse

Using the Industrial Metaverse, visually interact and experience everything across a product or production lifecycle to connect design and manufacturing and scale up their production in no time.





Leverage Industrial Metaverse to showcase capability
 Scale-up production with Siemens Xcelerator
 Maximize plant through put and energy efficiency
 Optimize an entire sustainable value chain

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Industrial Metaverse





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Active Issues 0	Number of Cycles
Last Serviced 03 March 2023	Next Service Date 03 June 2023
Mean Amb Temp 16 °C	Mean Vibration 0.000161 m/s ²

Siemens Blueprint for Industrial Metaverse

Siemens to invest €1 billion in Germany and create Blueprint for Industrial Metaverse in Nuremberg region

- Investment of €1 billion planned in Germany, €500m for new net-zero emissions Technology Campus in Erlangen
- Part of €2 billion global investment strategy in 2023 for boosting growth, innovation and resilience across all regions
- Further investments in Europe and the U.S.
- New campus to become global development and Manufacturing hub and nucleus for technology activities for Industrial Metaverse
- Conversion of existing site for power electronics components and machine tool controls

Siemens Blueprint for Industrial Metaverse

A holistic approach to leverage advantages of digitalization for engineering and operation



Collaborative planning



Simultaneous engineering



Collaborative problem solving



Supply chain digital twin



Machine lifecycle digital twin



Physics-based production simulation



Synthetic data generation to train algorithms



Accelerating sustainability



Customer-integrated service collaboration



Digital training and guidance





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Siemens Digital Industries Motion Control

SIEMENS



Al & Metaverse example



Virtual manufacturing engineering

Accelerate your production process development with connected virtual multi-disciplinary engineering

Validate producibility with a reliable virtual version of production

Virtual iterative commissioning to shorten launch time

Produce sustainably by simulating energy and material usage

Gain efficiency with on-time digital guided workforce

<image>

Virtual training fleet of robot perception with physical and added synthetic data





TWIN MARINE HEAVYLIFT

Uses Simcenter STAR-CCM+ to analyze the effects of buoyancy tanks on vessel stability

Customer challenge

Transport extreme-weight offshore platforms Design new marine lifting systems to help dismantle offshore platforms

Solution

- Use Simcenter STAR-CCM+ to analyze complex water forces and course stability issues for heavy lifter
- Understand interactions between buoyancy tanks and ship's hull

Customer benefit

- Validated that Simcenter STAR-CCM+ CFD techniques can be used to predict the complex phenomena associated with marine lifting systems
- Indicated a periodic pattern of flow around the hull tanks

Automatic Reporting & Feedback Demo

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Teamcenter for Microsoft Teams

Challenge

 Frontline workers can't easily communicate product issues they observe with engineers

Solution

- Teamcenter app on Microsoft Teams uses generative AI, powered by OpenAI
- Capture and report problems in real time, on any device, using natural language

- Save time spent on filing problem issues
- Decrease number of unreported product issues





Teamcenter AI Chat

Challenge

 Locating information buried in documents

Solution

- AI-powered chatbot enables natural language query of document-based knowledge in your Teamcenter environment
- RAG architecture grounds LLM responses in your data and adheres to access management policies

- Find information faster / easier
- Traceability of document / information sources

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Al Copilot NX X Only

Challenge

- How do perform a task in NX X?
 Solution
- AI-powered chatbot enables natural language query of NX documentation
- You giving, ask your question in your natural language.

- Find information faster / easier
- In addition to giving, you the answer it has the links to directly run the needed NX command.





Tecnomatix Process Simulate Collaborate Ergonomics

Challenge

 Accurate 3D posture modelling is vital for valid ergonomic analyses but can be time-intensive & requires expertise.

Solution

 An AI-based tool to automatically generate 3d human poses from a basic photograph

Benefit

- Advanced posture modelling with minimal time and effort.
- Instant access to detailed results online.



Link to video

Released



Insights Hub Quality Prediction: Use AI to improve quality and reduce rework costs

Challenge

 Improve insight on how process parameters impact quality as well as detect or avoid deficient parts

Solution

 Use a quality prediction model to identify process parameters with the highest impact on quality and constantly monitor quality of operations in production

Benefit

 Less rework, less unnecessary measurement costs, more efficient use of resources







Insights Hub Edge Analytics: Detect machine health issues automatically

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Challenge

- Significant cost impact of equipment downtime across industries
- Early symptoms were present but were neither recognized nor analyzed

Solution

- Add vibration data as early condition indicator
- Preprocess data on the edge incl. automatic detection of anomalies in frequency spectra
- Inform maintenance teams and provide means for RCA

- Higher machine availability
- Reduced maintenance cost

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